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NOTICES FROM THE LICK OBSERVATORY.*

Prepared by Members of the Staff.

New Gases in the Earth's Atmosphere.

Our readers will remember notices in Vol. VII (pp. 61 and 88) of these *Publications*, calling attention to the discovery by Lord Rayleigh and Professor Ramsay of a new atmospheric gas called by them *argon*. These investigators and others have continued their researches along the same lines, being aided by the recent improvements made in the process of liquefying air by means of which extremely low temperatures may be produced. The result is the discovery of at least two new gases in the Earth's atmosphere, and of a third which may prove to be new.

Messrs. Ramsay and Travers communicated to the Royal Society on June 3d of this year a preliminary note on *krypton*, the first of these new gases. From 750 $^{cu\ cm}$ of liquid air, they obtained 27 $^{cu\ cm}$ of a gas whose spectrum differs from that of any other known element. Besides many feeble lines, the spectrum exhibits two brilliant lines, one at λ 5869 (very near the D_3 line) and the other at λ 5570.

The properties of the new gas are not yet fully determined, but the discoverers venture the conjecture that its density will turn out to be 40, with an atomic weight of 80. By comparison of the length of a sound-wave in it and in air, krypton is shown to be monatomic and an element.

The coincidence of the line λ 5570 with the principal line of the Aurora has been noted by several observers, and it is suggested that we have "at last the true origin of that hitherto perplexing line." In this connection, it is of interest to recall the experiments by Liveing and Dewar in passing sparks through small layers of liquefied oxygen, air, and nitrogen. (See brief review in *Astrophysical Journal*, Vol. I, p. 88.) Under certain conditions of temperature, pressure, etc., the spectrum of liquid oxygen showed a line at λ 5572. "The wave-length of the auroral line is λ 5571.6; and the conditions of temperature and pressure in these experiments must have been somewhat similar to those under which the Aurora appears. This points, of course, to the probability of the auroral line being due to the oxygen of our atmosphere."

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Still more recently, Professor RAMSAY and Dr. NORMAN COLLIE succeeded in liquefying a quantity of argon. It formed a colorless fluid, but two other products also resulted. These were a lighter gas which failed to liquefy, and a solid deposit which gathered on the sides of the tube.

The lighter gas was drawn off and its spectrum examined. In Professor RAMSAY'S announcement to the Royal Academy, on June 16th, the spectrum of this gas, called by him *neon*, is described as containing a large number of strong lines in the red, orange, and yellow, and in the deep violet. Experiments to determine its density seemed to indicate that the gas had not been obtained in its pure form.

These two gases are undoubtedly new elements; but the third, obtained from the solid frozen out of the argon, may yet prove to be a new compound of known elements, rather than a new element. This substance, called *metargon* by its discoverers, has a density of 19.87, the density of argon being 19.94. Its spectrum showed many bands whose wave-lengths are closely coincident with those in the band spectrum of carbon and with three cyanogen bands, as was pointed out by Professor SCHUSTER (*Nature*, Vol. LVIII, p. 199).

The spectroscopic evidence is therefore strong that it is some carbon compound rather than a new element. Subsequently (*Nature*, Vol. LVIII, p. 245), Messrs. RAMSAY, TRAVERS, and BALY describe precautions taken, and chemical tests applied, to exclude the possibility of any carbon existing in this gas, and ask for a suspension of judgment pending further investigation.

R. G. AITKEN.

THE MINOR PLANET (334) *CHICAGO.*

This small planet was discovered, photographically, by Professor MAX WOLF, at Heidelberg, August 23, 1892. While